Issue 4/January 2004

The MO-13 Soils Newsletter.

"In Soils We Trust"

From the Desk of the Soil Survey Region 13 Staff Leader

by Steve Carpenter, NRCS

Back when I started my career in the Soil Survey, I attended a staff meeting where the state conservationist challenged us to recognize and adapt to change. He told our staff that "we would probably see so many changes in the next five years that many of us would not recognize the Agency". Over those next several years, I witnessed many changes in the Soil Survey. I watched as the introduction of computer technology changed the workplace from the hand written word to an electronic message. I watched as the Digital Orthophoto became the preferred backdrop for soil survey publications. Now, we have completed over 1700 SSURGO datasets which is not a small feat, considering the stringent data standards and the complex line work. Having traveled to many places in the world and studied soil survey programs, I can safely say that our data is far superior to any I have seen in England, Germany, Canada, or New Zealand. Most of these countries have the equivalent of our STATSGO and it is not digital. All things considered, I am very proud of our soil survey program both nationally and here at home.

This past year, West Virginia reached a milestone when they completed the initial soil survey for the state. West Virginia joins Pennsylvania, Maryland, Delaware, and Ohio in the MO-13 area as completing their "once over**".** *My main thought for this message is that the completion of the initial soil survey is really our beginning***.** Taking this a step further, ***the new age of the soil survey begins when all of our data is in digital format*****.** We are over half way there and hope to be all the way there by 2007. Then, and only then will we have a truly dynamic database.

I will repeat what a state conservationist said to a group of soil scientists over twenty years ago: ***You are going to see so many changes in the soil survey***

program in the next ten years that many of you may not recognize it. The big change begins when we are all digital. We have been requested to have all of our counties in a digital format by 2007. As we look ahead to 2004, we will face many changes. First, I can tell you that our new division director, Michael Golden, will enhance efforts to continue the implementation of the MLRA concept. He is urging the MO Leaders to "move fully forward" with the concept by completing the development and circulation of the MO-wide MOUs and working with the states to establish MLRA Project Offices in the right places. You can see division's commitment to this by noting that the soil survey project manager's position (Tommie Calhoun's old job) is already posted. In addition, the Soil Survey will develop 3 geomorphologist positions (East, Central, and West) to assist the MOs with soils occurring in their natural extent across county and state boundaries. We will begin the retool of NASIS in 2004. We will migrate from the unix/INFORMIX world to the Microsoft SQL Server environment (or equivalent). A user group has been formed to address NASIS functionality particularly a data compare tool and a data aggregation tool. In my "New Age Vision", I am beginning to see everything being linked together: SSURGO, NASIS, LIMS,and OSDs are all working together in a seamless system. SoLIM will be a routine tool in every MLRA Project Office. The Soil Survey is the most technologically advanced program in NRCS in 2004. I look forward to a great New Year and wish you well as you hit the field again this spring. Remember, there is always something to do in the soil survey project office. Have a good year!

Technical Note 4: Water Table Data in NASIS

by Robert Dobos, NRCS

The recording of water table data in NASIS has been a confusing topic from the inception of the software. Consider that the phrase "water table depth" does not occur in the database but rather the phrase "Component Soil Moisture," and the conspiracy theory advocates go off into an Orwellian double speak spasm. Depth to the seasonal high water is one of the most important properties of a soil in terms of interpretations; hence, it behooves us to get it right.

Soil moisture status and its fluxes with time are recorded in the Component Soil Moisture Table, which is one of the tables down from Component Month. Soil moisture status is the mean monthly soil water state at a specified depth and is classed as "dry," "moist," or "wet." We are capable of recording a profile of the soil moisture distribution in a component for each of the 12 months. If a component is thought to have very little or no "significant" saturation during the course of a year, the Component Soil Moisture table for that component has been traditionally left null (blank). The dry

Continued on page 2.

Inside This Issue:

Technical Note 4: Water Table Data in NASIS

Continued from page 1.

state is not typically used in the East, but theoretically is plausible in some areas.

Generally speaking, we recognize two types of water table. First is the "apparent" water table. Think of this water table as a regional aquifer that you could pump. The soil is more or less saturated from where wetness is first recognized until some depth below 200 cm, with no breaks in the saturation.

Typically, this is the kind of water table you would see in a soil on a flood plain. Figure 1 illustrates how this situation might be shown for the month of January in a poorly drained soil on a flood plain.

Note that two layers are indicated: first, an upper "moist" layer, and second, a lower "wet" layer that extends to the bottom of the soil profile described. The key here is that the bottom layer shows a moisture status of "wet." A moisture status of "wet" in some layer of a component is NASIS-speak for a water table. Interpretations that are looking for the depth to seasonal high water are typically keying on the RV of the top depth of the layer having the moisture status of "wet." The wet layer does not have to have a strong one to one correspondence with the horizons of the component described in the Component Horizon Table, but should at least to an extent reflect the depth to redoximorphic features in the Taxonomic Unit. The Component Soil Moisture Table is populated for each month a component has a layer having a soil moisture status of "wet."

The second type of water table is a "perched" water table. In this situation, a restrictive layer (what the hydrogeologist may term an aquitard) is in the soil. In fragipan soils and in many other soils having a "tight" layer, water sits or perches on this layer for a significant period of time during the year, but

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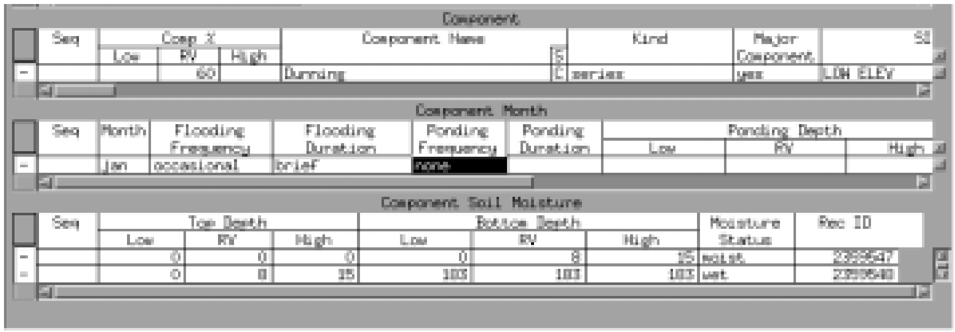


Component

Seq	Comp % Low	Comp % RV	Comp % High	Component Name	S	Kind	Major Component	SI
		60		Dunning	C	series	yes	LOW ELEV

Component Month

Seq	Month	Flooding Frequency	Flooding Duration	Ponding Frequency	Ponding Duration	Ponding Depth Low	Ponding Depth RV	Ponding Depth High
	jan	occasional	brief	none				

Component Soil Moisture

Seq	Top Depth Low	Top Depth RV	Top Depth High	Bottom Depth Low	Bottom Depth RV	Bottom Depth High	Moisture Status	Rec ID
	0	0	0	0	8	15	moist	2359547
	0	8	15	183	183	183	wet	2359548

Figure 1.—Component Soil Moisture for Dunning soils (Fine, mixed, active, mesic Fluvaquentic Endoaquolls) in January, illustrating an apparent water table.

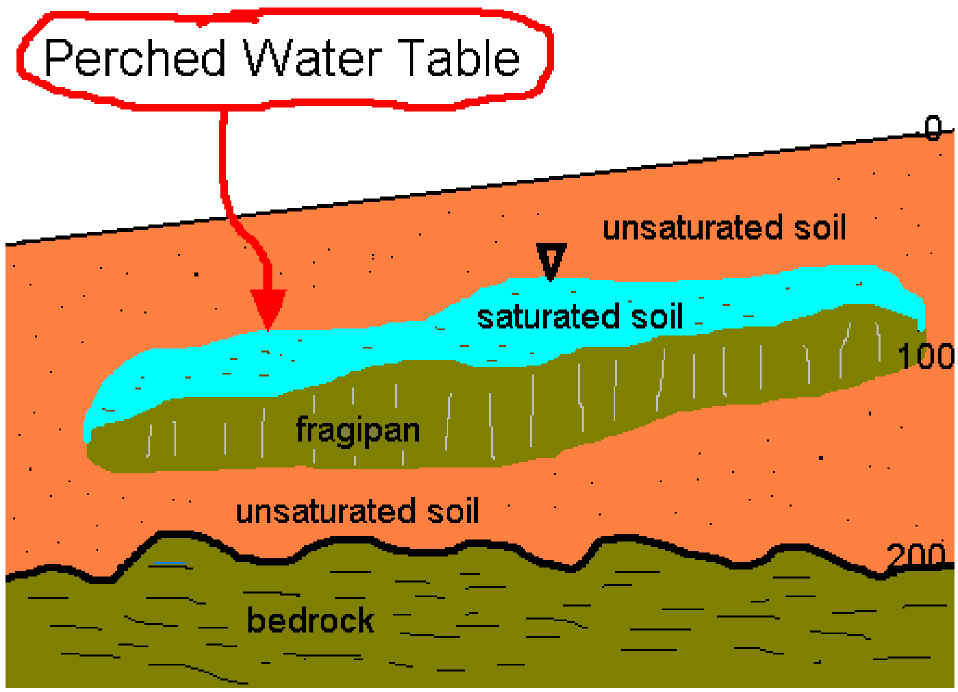
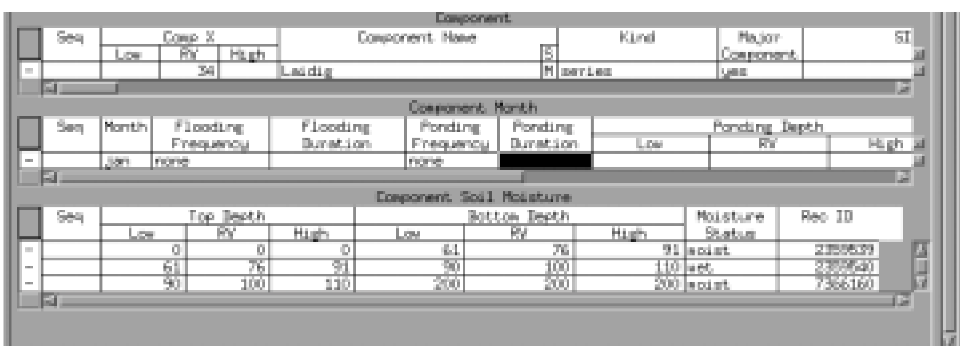


Figure 2.—A perched water table.



Component

Seq	Comp % Low	Comp % RV	Comp % High	Component Name	S	Kind	Major Component	SI
		34		Laidig	M	series	yes	

Component Month

Seq	Month	Flooding Frequency	Flooding Duration	Ponding Frequency	Ponding Duration	Ponding Depth Low	Ponding Depth RV	Ponding Depth High
	jan	none		none				

Component Soil Moisture

Seq	Top Depth Low	Top Depth RV	Top Depth High	Bottom Depth Low	Bottom Depth RV	Bottom Depth High	Moisture Status	Rec ID
	0	0	0	61	76	91	moist	2359539
	61	76	91	90	100	110	wet	2359540
	90	100	110	200	200	200	moist	7366160

Figure 3.—Population of a perched water table in NASIS.

NASIS Technical Note 4: Water Table in NASIS

Continued from page 2.

unsaturated soil is below the restrictive layer. This phenomenon becomes quite significant where more permeable material is found below the restrictive layer, since the restriction can be physically removed for some engineering applications (such as onsite effluent disposal). Figure 2 illustrates in a general way a perched water table.

Figure 3 shows how the Component Soil Moisture Table may be populated for a Laidig soil (fine-loamy, siliceous, mesic, semiactive Typic Fragiudults) in January.

Study of figure 4 reveals several points. First, the top of the uppermost layer always starts at 0 cm. (This is also true for apparent water tables.) Second, the bottom of one layer is the top of the next layer down. Thus, 76 cm is the bottom of the upper moist layer and the top of the saturated layer. Likewise, 100 cm is the bottom of the saturated zone and the top of the lower moist layer. The perched water table phenomenon is shown by the fact that a dryer zone exists below a "wet" one. In this example, the fragipan is assumed not to be saturated with water, which may or may not be true in the real world.

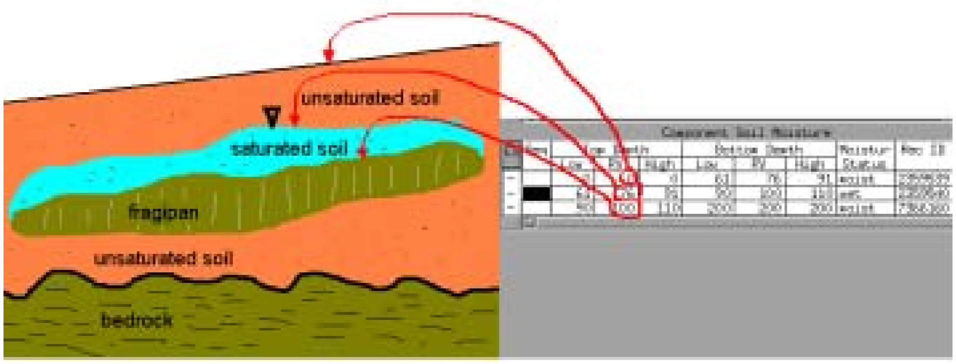


Figure 4.—Perched water table and Component Soil Moisture Table denoting a perched water table.

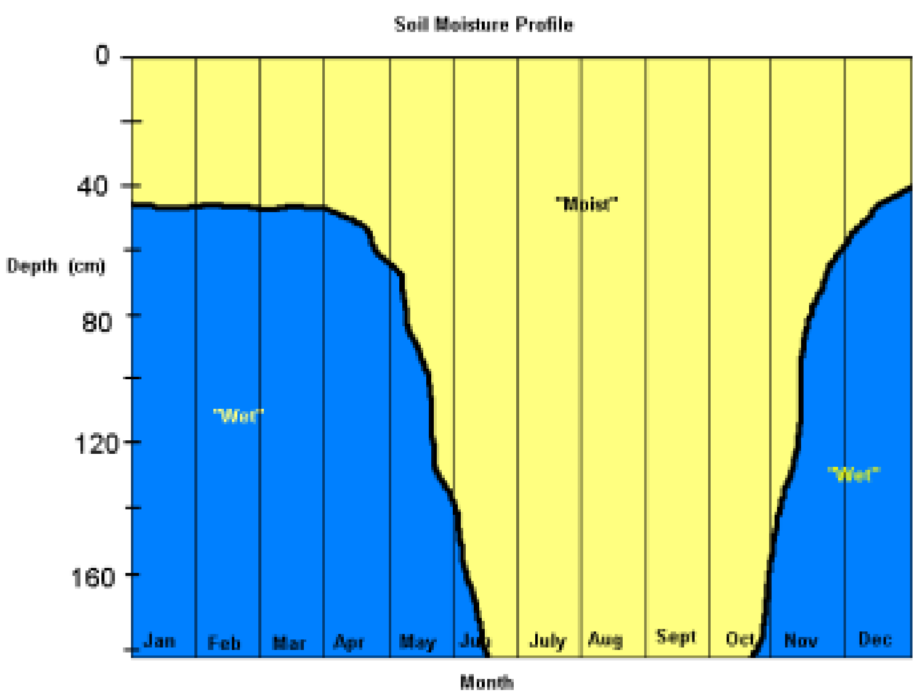


Figure 5.—Moisture profile for an apparent water table.

The range in values for the depth to the top of the "wet" layer represents the variation in that depth both temporally (for this month from year to year) and spatially (for this component from one location to another). The range in values to the bottom of the "wet" layer (top of the aquitard) represents only the spatial variation in that depth since it does not change from year to year. The bottom boundary depth of the lower moist zone is generally arbitrary at this point in the development of NASIS. The number selected must exceed 183 cm, because property scripts used in generating interpretations look to that depth in searching for saturation. There is, of course, no reason that the value could not be measured, if one was so inclined. Some soil series concepts may push saturation or evidence of saturation below 200 cm. In new datasets, all soils should be described to a depth of 200 cm. Conceivably, an apparent water table could exist below the perched water table at any time or throughout the year.

Aligning soil moisture with month gives one the ability to construct a moisture profile with time. Figure 5 shows a moisture profile for a soil with an apparent water table, and Figure 6, a soil moisture profile for a soil with a fragipan at about 75 cm and a perched water table. When evapotranspiration starts in Spring, the water table falls rapidly. When it stops and leaves drop from trees in Fall, the water table rises.

In a dryer climate, a lens of "dry" soil may be found in summer. Typically in the East, we do not describe a dry moisture status. In the East, could a soil have a monthly mean moisture status of "dry"? Not likely, because we are describing the <u>mean</u> monthly soil moisture status for the layer.

Other scenarios are possible and even probable, such as those shown in Figure 7, which shows the soil moisture profile for a soil having an apparent water table in Spring and Fall and a perched water table in Winter.

Continued on page 4.

NASIS Technical Note 4: Water Table in NASIS

Continued from page 3.

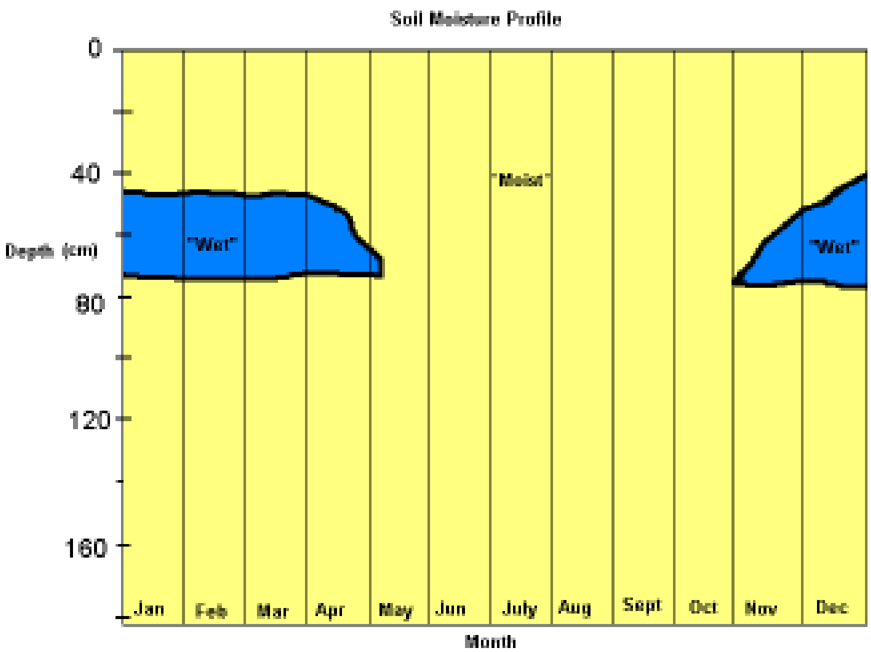


Figure 6.—Moisture profile for a soil having a perched water table.

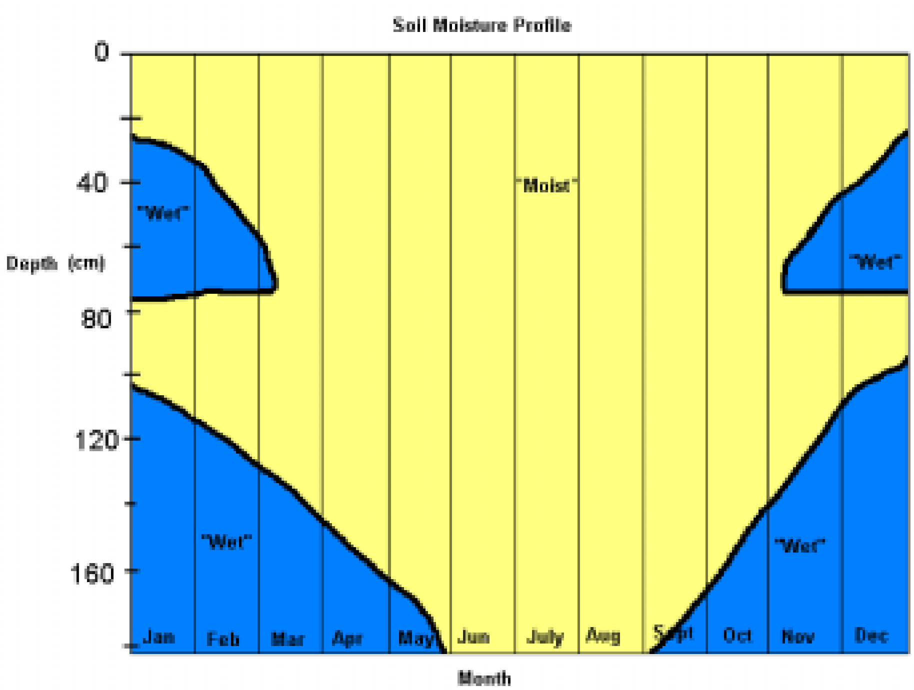


Figure 7.—Moisture profile for a soil having both an apparent and a perched water table.

The Component Soil Moisture Table is to be populated for each month that a water table ("wet" layer) is present at some depth during the year. A soil is considered not to have a water table if it or evidence of it is never observed. The rationale is that if saturation is so transient that you do not observe it and that if it does not leave a footprint (redoximorphic features), then the impact on land use will not be deleterious.

The records in the Component Soil Moisture Table are sorted based on this precedence: Sequence Number (Seq), Top Depth RV, Bottom Depth RV. Leaving the Seq null and letting the table sort on the Top Depth RV is preferable. As data were converted from SSSD, the Moisture Status column is either "wet" or null. From the previous discussion, we can likely assume that entering "moist" will be accurate if a layer is not "wet" in the Eastern States. At present, the null moisture status field is not a problem, but it could become one if an interpretation using component soil moisture employs a "Null Hedge." (That is a topic for another day.)

Null values for the representative value for the bottom depth of the "wet" layer and the representative value of the top depth of the lower "moist" layer were converted for many components having a perched water table. This causes the records in the Component Soil Moisture Table to sort in a strange manner. Also, the effect of the perched water table will not be recognized by property scripts looking for a perched water table. Careful scrutiny is warranted of the Component Soil Moisture Table for any soil having a fragipan or any other water-restrictive layer.

This discussion should clear up some of the confusion. If you need further assistance or want to make a suggestion, please call me at 304.284.7588. ■

Faces From the Field

by Natalie Irizarry, NRCS

Yauco, Puerto Rico

I was born and raised in Yauco, in the southern part of Puerto Rico. After finishing high school, at age 19, I moved to the western part, where I attended the University of Puerto Rico, Mayaguez Campus.

I don't have any relatives associated with or interested in farming or agronomy, but for some reason, I was always interested in anything related to plants and their growth processes. I decided to study Agronomy in college. After I investigated the various departments associated with Agronomy, I decided to study soils. Why soils? Because the soils department interested me the most and fewer people majored in soils.

An Internship

After 3 years' studying soils I heard about an internship in Pennsylvania for a soil scientist position with the Natural Resources Conservation Service (NRCS). I decided to apply, and after a month I was accepted. By this time, I was very excited, but also very nervous.

After talking it over with my parents and my boy friend (husband now), in 1999, I flew to Pennsylvania. I would be without family and friends, with totally different language, food, and weather, starting a new job, and having no field experience.

However, before I came, NRCS found a family that wanted me to stay with them for a couple weeks until I found a place to live. I was anxious about living with a new family that had a 3-year-old child that maybe wouldn't like me. After I met them and spent 2 weeks at their house, they decided that if I wanted to, I could continue to live with them for the term of the internship. I thought it was a good idea to stay there and I accepted. Living with them was the best thing that I did. I really had a good time learning everything about them, especially Brandon, their son. We all had fun becoming acquainted with each other.

Enjoying, with other soil scientists, the Basic Soil Survey course (June 2003)

Greensburg, Pennsylvania

On my very first day on the job in Greensburg, the party leader was on vacation and another soil scientist was there. When I met him, he started talking so fast that I could barely understand half of what he said. I thought about going back home. But after a couple of hours, he slowed down and I could comprehend what he said. A week later, I met my boss and started working in the field.

I really started to understand soils on this job. Everything was new, interesting, and exciting for me. Working in Westmoreland County, within MLRA's 126 and 127, I discovered and experienced terraces, flood plains, clay films, and redoximorphic features. These things before were just words on a page, but then were beginning to take on new meanings.

After going back to Puerto Rico and finishing my bachelor's degree, I had the opportunity to return to the NRCS office in Greensburg, Pennsylvania. By this time, my party leader and other coworkers had finished updating the Soil Survey of Westmoreland County and were then updating Fayette County.

Updating and Classifying Mined Areas

Right now, we are working in Indiana and Jefferson Counties, still in the southwestern part of Pennsylvania but with different geology and different soil series. Our first goal is to update and classify mined areas. I am also learning and becoming skilled in GPS and GIS applications, NASIS database entry and

Continued on page 6.

Faces From the Field

Continued from page 5.

editing, and soil survey manuscript development.

Hydric Soils Training

Last summer, I went to Maryland and Delaware for hydric soils training, where I learned the characteristics of these unique soils. I also attended the Basic Soil Survey training course in Lincoln, Nebraska. This course taught us everything related to being a Soil Scientist: NASIS, hydrology, geomorphology, lab work, and tips on doing a better job in the field. All these subjects gave me different perspectives on what I can do. One of the side benefits of that course was meeting other soil scientists from around the States and getting to know a little bit about what they are doing. My goal right now is to keep learning and to be a better soil scientist. I hope sometime in the future to complete a master's degree.

Besides working, I like to spend time by myself, relaxing, exercising, and going shopping. I also like to have a good time with my husband, Javier, exploring different places in Pennsylvania and neighboring States. We like visiting different restaurants and trying all kinds of food. We love museums and parks, too. We also like to spend time with the family that "adopted" me and gave me "unconditional" help and love during my 4 months of internship.

Working on reclaimed strip mine spoil correlated as the Fairpoint Series.

Our Future

I said before that I was nervous about coming to a different place without family and friends, but now I say that I'm very lucky and blessed to be here, where I found not just one, but two families that I really love and appreciate: my Pennsylvania home family and my work family. About the weather, food, and language, I am still working on them. It is not very easy, but I think I am doing better.

I miss the people I grew up with in Puerto Rico and love with all my heart: my family and friends. I do miss my beautiful little island where I was born and have my past. But I can say that I feel very pleased to be here with my husband, creating our present and thinking about continuing our future in United States. ■

On a field review in Clarion County, Pennsylvania, correlating soils on a G slope to the Varilla series.

Rising Sun: The Soil Survey Information Center, Summersville, West Virginia

by Charles Delp, NRCS

About 23 years ago, Bill Hatfield, then West Virginia's State Soil Scientist, authorized a map compilation unit to be located in Summersville, West Virginia. Bill wanted to help relieve the backlog of soil surveys where the fieldwork and manuscript were completed but where the maps were not ready. And, he wanted to correct the numerous errors on map compilations done on contract.

The original staff of the new unit included Linda Campbell, Teresa Huffman, Karen Morrison, and Paul Amick. Paul was a member of the Nicholas County soil survey party, and I was the survey party leader. Paul, who reduced his duties in soil mapping, assumed management of the compilation unit. Linda, Teresa, and Karen were originally hired as Biological Aides under the WAE program. I continued to manage the soil survey of Nicholas County and also helped to train the new employees in map compilation techniques.

The compilation unit embarked on the very tedious, time consuming process where spatially incorrect field sheets completed by field soil scientists are compiled or transferred to a corrected base map. The unit's first project was Mercer and Summers Counties, West Virginia, which became the only survey in the State that was manually inked after completion of map compilation. Though the project turned out well, the unit was not totally happy with the appearance of the soil lines.

There obviously had to be a better way to do the finish work after the compilation was completed. After some research, the unit turned to scribing, which was a superior technique to inking. Carto provided the unit with some scribe coats, but not with the scribing tool used to etch or scribe the soil lines. After a little head

Continued on page 7.

Rising Sun: The Soil Survey Information Center, Summersville, West Virginia

Continued from page 6.

The staff of the Soil Survey Information Center in November 2003. Front row, Linda Campbell and Teresa Huffman; standing, Melissa Blankenship, Debra Murphy, Denise Donelson, and Charles Delp.

scratching, Paul figured that a 16-penny nail would work just fine. Well, as you might expect, a 16-penny nail is good for framing up a house but it isn't exactly the precision tool needed in scribing.

I called Bill Hatfield to request a scribing demonstration from Carto. Paul, Linda, and I went to Morgantown for training on the proper use of scribe coats and scribers. After seeing the scriber, a little three-legged instrument with a jewel point, and how nicely it worked, we agreed that it was probably superior to a 16-penny nail. But then again, Paul and I figured that a 16-penny nail was superior to a scriber for framing up a house, so things worked out about even.

Turning field sheets into maps

Our methods have changed over the years in how we transform soil survey field sheets into published maps. For many years, when a field soil scientist finished the fieldwork and inked the aerial photographs, we made transparent film positives of the field sheets so that compilers could easily see the cultural features and line work on a light table. The compilers could then transfer the soil lines from the incorrect scale (on the field sheets) to a corrected scale (on the orthophotographs). They registered compiled sheets and scribe coats to the correct datum and scribed all the soil boundaries.

Scribers prepared three separate scribe coats for soil boundaries, drainage, and roads. Carto then made the scribe coats into a composite, combining all three layers into one. A composite ensured that features did not touch, and eliminated other cartographic errors.

Map editing

In the final step, the compilation unit applied type onto the type overlay. We ordered type for all soil symbols, place names, stream names, etc., cut out type a piece at a time with an Exacto knife, and stuck it on the type overlay. In a complete edit, we would eliminate as many errors as possible. Carto would then place a composite over the most recent photographic background available and make a final negative to use in printing the soil maps for the published report.

Over the years, the unit has seen many personnel changes. Karen Morrison left to pursue other interests. Debra Murphy joined the staff in 1985 after working at Island Creek Coal Company as a drafting technician. Denise Donelson, originally a volunteer in 1987 helping with the typing and editing of the manuscript for the Soil Survey of Nicholas County, West Virginia, in 1992 became a permanent member of the map compilation unit. Melissa Blankenship joined the staff in 1995 as a WAE. She later became a part-time employee of both NRCS and the West Virginia Conservation Agency (WVCA). In 2000, she became a full-time employee of WVCA working with our unit. In 1997, Lurae Currence, our most recent addition, started working at the Weston Field Office.

When Bill Hatfield and Paul Amick both retired in 1994, Steve Carpenter became the State Soil Scientist and I became the Assistant State Soil Scientist headquartered in Summersville with duties that included supervision of the map compilation unit. Steve then changed the name of the unit to the Soil Survey Information Center (SSIC). SSIC would still be responsible for producing maps for soil survey publications, and it would also be responsible for maintaining the soils database for the entire State.

One constant: change

Change has been our constant companion at the Soil Survey Information Center. Prior to about 1990, the corrected base map we used was an analog orthophoto in a one-third-quad format. About 1990, when in fact everything started becoming digital, we started using digital orthoimagery, commonly called DOQ. Steve Carpenter and a few other people across the country were the early pioneers in such digital software programs as GRASS, where electronic surveys were made on digitizing tables. The Digital Age not only has changed the way we compile maps for publication of soil surveys, it has completely influenced all

Continued on page 8.

Rising Sun: The Soil Survey Information Center, Summersville, West Virginia

Continued from page 7.

Teresa at a light table, compiling a map.

aspects of soil survey across the entire country.

Today, we still compile and scribe soil maps at the Soil Survey Information Center. We no longer use type or type overlays, and perform most steps electronically. However, we are probably the only people in the Agency nationwide who are scribing. Although it seems to be becoming a lost art, scribing is still superior to other methods.

The Soil Survey Information Center is responsible for producing materials in several key areas. Map compilation continues to be a top priority. Linda, Teresa, Debra, Missy, and Lurae do most of the compilation, editing, and scribing for all surveys in West Virginia and for other States in MO-13. They also train soil scientists from throughout the State in map compilation techniques. SSIC also participates in field activities with the West Virginia soil survey staff. For the past 2 years, the staff has worked hard on preparing soil monoliths for our conservation districts.

SSIC not only compiles previously published soil surveys, but also edits map compilation from other States within MO-13 to ensure they meet minimum SSURGO requirements. We are also digitizing several West Virginia soil surveys and posting them to the Web to be downloaded to the customer toolkit for

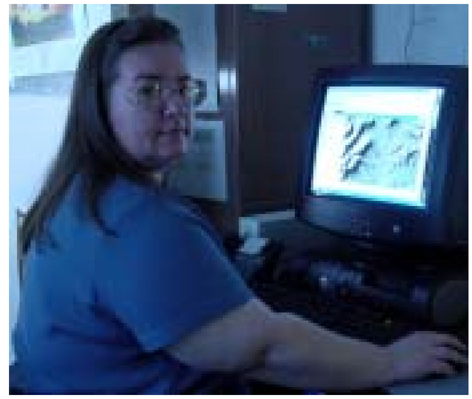
Linda compiling a map.

Charles working with NASIS.

use at field offices. Denise is our resident expert in the LT4X and LT2000 programs used in the SSURGO certification process, for which I prepare the tabular data and interpretations from the NASIS database. SSIC is working hard on achieving the goal, which is also a goal for all other States, of digitizing all soil survey areas in West Virginia by fiscal year 2007.

To-do list

Digital map finishing is another area we hope to add to the growing list of duties at SSIC. The days of type and even manual compilation are over. When we have recompiled the backlog of old surveys and saved them as electronic files, we will be using Orthomapper, Maple Syrup, ARC, and other software in maintaining



Denise finishing a map.

Melissa with a scriber and scribe coat.

Denise holding a scriber and a digitizing puck (now obsolete).

our surveys. We will use digital map finishing software in producing electronic files of soil survey maps for publication. At SSIC, we know that things in this digital age will require constant change, and we are looking forward to the challenge. ■

The 1905 Soil Survey of Upshur County, West Virginia

by Gabriel Hiza, NRCS

Almost 100 years ago, some 11 years after the beginning of the national soil survey in the United States, the first soil survey in West Virginia was started. On Apr. 25, 1905, A.W. Griffen, soil scientist, reported in a handwritten letter from Buckhannon, Upshur County, West Virginia, to Milton Whitney, Chief of the Bureau of Soils, Washington, D.C.:

"I arrived here on May 5 and found Mr. Ayrs waiting. We spent today in the field driving across the upper portion of the county and will probably start the mapping on Monday. I will write you a description of the types as we find them next week.

"The county is very rough and broken and the stream bottoms narrow. In general, it seems to be made up of shales containing numerous strata of sandstone. We shall probably have one or two shale loams, a bottom loam along the streams, a stony loam, and a small amount of rough stony land. We may find later that in some cases the sandstone is so much in evidence that a sandy loam is the resultant soil, but have not observed this condition as yet."

On May 9, 1905, Whitney replied: "I should be glad to have a description of the soils as soon as you have seen enough of these to furnish it.

" Very truly yours, Milton Whitney, Chief of Bureau."

The first soil survey in West Virginia had officially begun. Griffen had come in from Tangipahoa Parish, Louisiana. Orla L. Ayrs completed the survey party. It is possible that upon graduation their college professors referred these two men to the bureau for positions in the soil survey. As Whitney received additional appropriations to expand the soil survey, professors such as Collier Cobb at UNC supplied him with a continual stream of graduates in geology and chemistry.

Although Whitney oversaw almost the entire soil survey from his office, George Nelson Coffey made an onsite inspection of Griffen and Ayrs' survey results.

Whitney, who was from Anne Arundel County, Maryland, was appointed Chief of the new Bureau of Agricultural Soils in 1894, renamed the Division of Soils in 1897 and the Bureau of Soils in 1901. The soil survey focused on soils as used in farm management systems. Whitney worked as a soil chemist and finally as a soil physicist at four different State Agricultural Experiment Stations. Upon his appointment as Chief, Whitney found administrative support for his theory that the most important soil properties were soil moisture and soil porosity, which he correlated to texture.

Soil texture thus became the basis for soil classification, the lowest category of which was the soil type. The soil type was a grouping of soils of a given locality and of a common texture in the surface layer. Soil texture was determined in the field and later verified in a soils laboratory. Soil types were identified by place name and texture, an innovation that came in under Whitney and that continues to this day.

The early soil types were broadly and loosely defined, comparable to fairly broad associations as defined and delineated between the 1950's and the mid-1970's. Variations within a soil type were identified as phases. The soil map of the Soil Survey of Upshur County, West Virginia, issued in 1906, measures about 21 x 31 inches. On a scale of 1 inch=1 mile, the smallest delineation on the map is about 1/12 inch.

This system of soil classification prevailed until about 1927. Simultaneously, Whitney continued to proselytize the soil survey in government and to use his personal agencies in supporting soil scientists in the field.

Preparations for the Soil Survey of Upshur County, West Virginia, had actually begun on Apr. 25, 1905, when Griffen in Hammond, Louisiana, asked Whitney for a plane table and an alidade "… besides the usual equipment and unless these are brought by Mr. Ayrs I should like to have them sent from the office. I enclose a list of other needed supplies for the area. [Griffen's list has been lost; a plane table and an alidade were instruments used in mapping soils at a distance.—Editor's Note]

"Respectfully Yours, AWG"

On May 16, 1905, Griffen asked Whitney for the U.S. Geological Survey Buckhannon folio to study the geology of the county.

Soil correlation, which began during mapping, lasted through the end of the year.

On May 31, 1905, Whitney noted that Griffen had finished the map work upon the two geological sheets forming the upper portion of the county. He also noted that Griffen had found another type of soil which corresponds very closely with the Dekalb stony loam. "You state that the interstitial material is a sandy loam, but you will note that this is the case with the Dekalb stony loam. It seems that there is little doubt that your soil should be correlated with the Dekalb stony loam."

In early June, Whitney held the line on proliferation of soil types in noting that Griffen had "encountered another type of soil which you called Buckhannon fine sandy loam. You state that you think it is similar to the Dekalb fine sandy loam as mapped in other areas, and from your description of this soil it seems to me that there is little doubt but that it can be correlated with the Dekalb fine sandy loam. I think it would be better when you find a new soil , which you think can be correlated with some established type, if you would use the name of that type rather than give it a new name."

On June 19, 1905, Whitney wrote to Griffen: "A copy of the analyses of the

Continued on page 10.

The 1905 Correlation of the Soil Survey of Upshur County, West Virginia

Continued from page 9.

preliminary samples of the soils from Upshur County, W. Va. were sent to you a few days since at Buckhannon, and will doubtless be forwarded to you.

"You describe the soil of the type which you have called Buckhannon shale loam as a loam, and the subsoil as a clay loam. The analysis shows the soil to contain 36% of clay and 46% of silt and would seem to indicate a heavy soil. The soil, however, contains many shale fragments which would make it act like a lighter soil. Would it not be better to describe the interstitial material as a clay loam rather than a loam?

"The soil of the Buckhannon clay is described as a clay loam, while the subsoil is called a clay. The analysis shows the soil to contain more than 50% of clay, which is about a high a percentage of clay as is found in any of our clay soils. In view of this fact do you not think that it would be better in your report to describe the soil as a clay rather than a clay loam?"

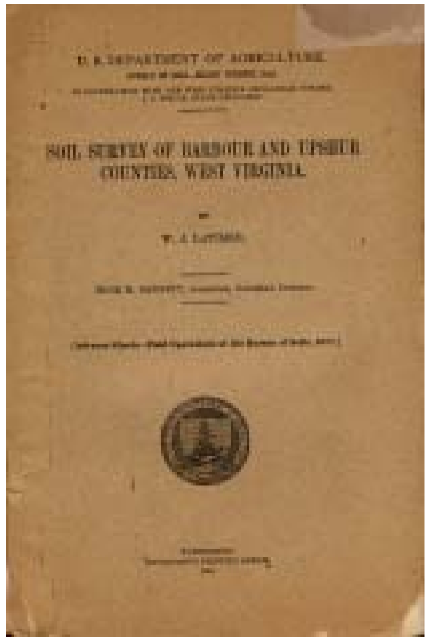
On June 24, 1905, Ayrs wrote:

"Prof. Milton Whitney, Chief of Bureau of Soils

"I have spent the past week in the southwestern part of the county between Rock Cave and Cleveland. This part of the county is somewhat mountainous, the ridges having an elevation of from five to eight hundred feet above the adjacent stream valleys. The principal formation is a gray sandstone. In some portions interbedded shales are noticeable. The sandstone gives a light sandy loam. Where the shales crop out the soil is somewhat heavier but the overlying sandstone gives it a sandy character and I have mapped the greater portion as Dekalb stony loam, the surface being quite uniformly covered with boulders and sandstone fragments.

"I enclose report card for the week.

"Yours truly, OL Ayrs"



Cover page of the manuscript for the Soil Survey of Upshur County, West Virginia.

When mapping was completed on July 29, 1905, and the maps drawn and the report written some days later, Griffen and Ayrs had mapped the following six distinct types of soils:

Upshur loam
Meadow
Dekalb stony loam
Buckhannon clay
Buckhannon shale loam
Buckhannon stony loam

On Aug. 7, 1905, Griffen complained to Whitney that "Some changes have been made in the names of the soil types since the work was started and others should be made. Mr. Coffey will probably have these in mind, but to avoid possible confusion I will state them here." Summarizing, he stated: "It would seem that the majority of the soils of the area should belong to the Dekalb series, but their general character is much heavier than the majority of those mapped as such."

The debate over the classification of soils in the county picked up in December, when Whitney wrote Griffen in Pensacola, Florida, to change the name of Upshur loam to Dekalb loam. He reclassified Dekalb stony loam where rougher and more stony as Rough stony land. Where it was less stony, he combined it with Buckhannon stony loam and called it Dekalb stony loam.

Whitney also decided to establish the Upshur series "…to cover the red soils associated with the Dekalb series. He thought Buckhannon clay was the clay member of the Upshur series and "…therefore called this type Upshur clay."

Whitney continued: "The Buckhannon shale loam does not appear to contain a large enough percentage of shale fragments to justify calling the soil a shale loam. It appears to be a heavy soil and to belong to the Dekalb series, and I have therefore changed the name to the Dekalb clay…

"The correlations as given above appear to us to be the ones which should be made, and if you know of any reasons why these correlations should not be made, I should be glad to have you state them."

The soil types, listed in descending order of dominance, in the published report include:

Dekalb stony loam
Rough stony land
Dekalb clay
Dekalb loam
Upshur clay
Meadow

After mapping Upshur County, West Virginia, Griffen and Ayrs moved on to Madison County, Kentucky. The Soil Survey of Upshur County, West Virginia, was issued in 1906. Even though he placed Curtis Marbut in charge of the new soil survey division in 1911, Whitney remained a strong influence on the soil survey and soil classification until 1927 and his retirement. He passed away a few months later. ■

SWCS Tour: The Schiff Farm, Whiteleysburg, Delaware

by Scott Schiff, Schiff Farms

[After I attended an SWCS tour of the Schiff Farm, the treasurer of the business provided the following description of operations.—Editors's Note]

On a sunny day in late August, participants of the 2003 SWCS Pocomoke Chapter Summer Tour visited Schiff Farms' new beef facility in Whiteleysburg, Delaware. Dr. Jim Schiff, sons T.J. and Scott, and well experienced management operate two feedlots with a capacity of 6,000 head as a primary focus of their agribusiness.

The new facility, providing for 2,200 cattle, maintains the highest standards of environmental stewardship via new generation livestock waste processing technology. Schiff provides beef to markets in Eastern States through a production relationship with Smithfield Foods, Packerland Packing.

Schiff feeds a combination of beef steers and dairy Holstein steers. The southeastern cattle backgrounding industry cyclically supplies native beef steers to the feedlot, while the enormous dairy industry of the Southwest provides a constant supply of Holsteins. Upon arrival, inbound weights form the basis of intensively managed performance data, shipping shrinkage, daily gain, and feed conversion/efficiency. Vaccinations for disease prevention aid the cattle's acclimation to the new environment and feed rations. Efficient processing equipment and personnel allow the processing and vaccination of three steers per minute. Cattle arrive weighing between 650 and 850 lbs. and grow to a finish weight of 1,250 lbs..

Processing facility for arriving cattle. The squeeze chute holds cattle in a comfortable position during vaccination for bovine shipping viruses.

Cattle are fed a total mixed ration three times per day, 80 percent of which comes from locally grown grains. High quality by-products and a nutrient supplement comprise the rest of their diet. Starter rations, fed for 14 days, provide a high concentration of corn silage roughage to acclimate the calves' digestive system prior to feeding the high energy finishing ration needed for lean, tender meat. Management of daily feed consumption by the 1/10th lb. per steer per day plays an integral part in maximizing beef production. Experienced cowboys walk all cattle pens daily, checking for sick or ailing steers. Any steer performing below its peer group is isolated for close observation and treatment in hospital pens.

Pen of Holstein steers in the new barn.

The new cattle barn, like the preexisting facility, houses the cattle in confinement for a double-sided benefit, maximum comfort and shelter for the cattle with maximum environmental control. It measures 700 x 85 feet and has pens on each side of a center alley by which trucks deliver the feed. Concrete flooring and side curbing allow retention of all nutrient waste. Cattle movement within the pens works the manure down a slightly sloping floor onto a 5-foot-wide slatted area the full length of the pen. Manure drops through the slatted floor into a trench that slopes from the end to the center of the 700-foot barn. Automatic timers begin a sequence every 6 hours to flush the trenches with 5,000 gallons of recycled gray water to a reception pit. Mechanical separation of solids and liquids yields the greatest means to reduce nutrient loads while meeting current and future stewardship practices and nutrient management regulations.

Manure pits to catch manure coming from the barn, where manure is flushed to a separator system. The back pit is a postseparator, where manure is pumped to a large liquid storage tank to be applied to crops and recycled.

Schiff operates rotary separators provided by Integrity Nutrient Control Systems. Two stages of rotary brushed screens and press rollers in the second half remove 75 percent of the solids. The flush water dilutes the manure solids to provide optimal influent to the twin separators. Separator operation coincides with the flushing cycle for a seamless process, 24 / 7.

A two-stage liquid storage facility allows for final solid settling with semiannual sludge removal in a 1.2-million-gallon storage tank maintained at full level. A second 2.2-million-gallon tank siphons from the surface of the first tank for further clarification. The 120,000 gallons of flushwater needed daily is derived from the surface of the final liquid storage

Continued on page 12.

SWCS Tour: The Schiff Farm, Whiteleysburg, Delaware

Continued from page 11.

without any addition of fresh well water, preserving water supplies. In addition, environment friendly irrigation equipment applying liquid nutrients onto growing crops alleviates environmental concerns of traditional manure sludge. Aerators in both storage tanks provide an aerobic environment to eliminate traditional waste storage and land application odors.

Flushtank, where manure is recycled to flush the barn.

Composting of separated solids reduces volume by 50 percent via moisture reduction while yielding a sweet smelling, peat mosslike organic. A loader tractor moves wet solids discharged by the separators to one of three composting bunkers. Variable-speed driven fans force air through 800 air nozzles in the floor of each bunker. Maintaining aerobic bacterial activity with high oxygen levels yields the conversion of manure solids to a dry, sweet smelling organic. Temperature and oxygen readings taken by stainless steel probes every 10 minutes are recorded by a specialized pc database.

Three fans in the rear of the bunkers provide air induction to each of the bunkers.

Parameters are manipulated by computer programming to follow a prescribed composting cycle of heating, pasteurizing, and cooling stages. Following the heating stage, pasteurization maintains a temperature of 150 degrees for 24 hours to guarantee pathogen- and weed seed-free compost. Temperature decreases as the biological activity decreases; thus, mature compost is achieved for marketing channels.

Compost bunker, two-thirds full, with stainless steel temperature and oxygen probes coming through the roof and forced aeration through the floor.

Marketing research and development are underway to penetrate a likely high quality compost market. Thereby, completely safe, pathogen- and weed seed-free organics may be exported to nutrient-deficient sites, such as new housing developments and home gardens.

The Delaware State office of the Natural Resources Conservation Service (NRCS) provided technical assistance and cost share via EQUIP. Ron Gronwald, NRCS State engineer, confirmed calculations made by Schiff's engineer and consultants. Approval of implementation and operation plans followed supervision of the engineering design for all cost-shared components of the feedlot. ■

The MO-13 Soils Newsletter.
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Tentative Calendar of Events

February 9-13, 2004
Final Field Review
State of Delaware

February 10-12, 2004
Corr. & Manuscript Assistance
Mason County, WV

February 12, 2004
Manuscript & Corr. Assistance
Monterey, VA

February 23-25, 2004
Manuscript Assistance
Clinton, Co., PA

February 23-27, 2004
NASIS Basic Training
Morgantown, WV

February 23-28, 2004
Progress Field Review
Cecil County, MD (Dover, DE)

February 26-27, 2004
Correlation Assistance
Bland County, VA

March 3-4, 2004
Field Assistance Visit
Fauquier County, VA

March 8-12, 2004
NASIS Report Writing Training
Morgantown, WV

March 29, 2004
Correlation Assistance
Monterey, VA

March 29-April 2, 2004
NASIS Intermediate Training
Morgantown, WV

April 7-8, 2004
Field Assistance Visit
Carroll County, MD

April 12-16, 2004
NASIS Interpretations Training
Morgantown, WV

April 13-16, 2004
Field Assistance Visit
Charles County, (LaPlata) MD

June 7-11, 2004
Progress Field Review
Talbot County, MD

June 20-24, 2004
NE Coop. Soil Survey Conference
Tucker County, (Canaan Valley) WV

July 19-23, 2004
Progress Field Review
Southeast Ohio

Sept. 13-17, 2004
WV Soil Survey Field Week